

Evolution of land plants transformed sedimentation on Earth¹

The vegetation of our planet irrevocably changed surface processes on Earth. New research suggests the evolution of land plants in the Ordovician caused an increase in the volume of mud preserved on the continents. This marked a change in global sedimentation, with implications for the study of sedimentary processes on our planet and beyond.

New research published today by Earth Sciences' Will McMahon and Neil Davies highlights the affect on the sedimentary rock record of Earth's transition from a barren planet to one with dense vegetation.

McMahon and Davies studied 704 alluvial units, spanning 3 billion years of Earth history from the Archean to the Carboniferous. Analysis of 1196 published reports and 125 new field investigations showed a single, significant increase in the amount of mudrock in river deposited sediments during the Ordovician, coeval with the evolution of land plants.

The similar timings of distinct sedimentary and evolutionary events is unlikely to be a coincidence. The authors suggest three mechanisms by which plants cause mud to be retained on land. First, plants increase weathering producing finer sediments such as clays. Second, their roots offer mechanical protection against erosion, facilitating the physical retention of mud in continental environments. Finally, plants can effectively capture grains from fluids moving over land.

McMahon comments "Researchers working on marine geochemistry and petrology should be conscious that their quantitative interpretations and sedimentary context depend on whether sediments were deposited in a pre- or post-vegetation world."

The work also has important implications for the study of extra-terrestrial sedimentary processes, at a time when research into the sedimentary geology of Mars is gaining pace. Assuming ancient Martian sedimentary rocks were deposited in the absence of vegetation, they can only be reliably compared to the oldest part of Earth's sedimentary rock record – before our own planet had plants - to understand how depositional environments on Mars behaved.

Evolution of alluvial mudrock forced by early land plants, William J. McMahon and Neil S. Davies is published in *Science*.

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